spinwriter®

7700 TERMINALS
PRODUCT DESCRIPTION

NEC

NEC Information Systems, Inc.

819-000062-8002
12-81

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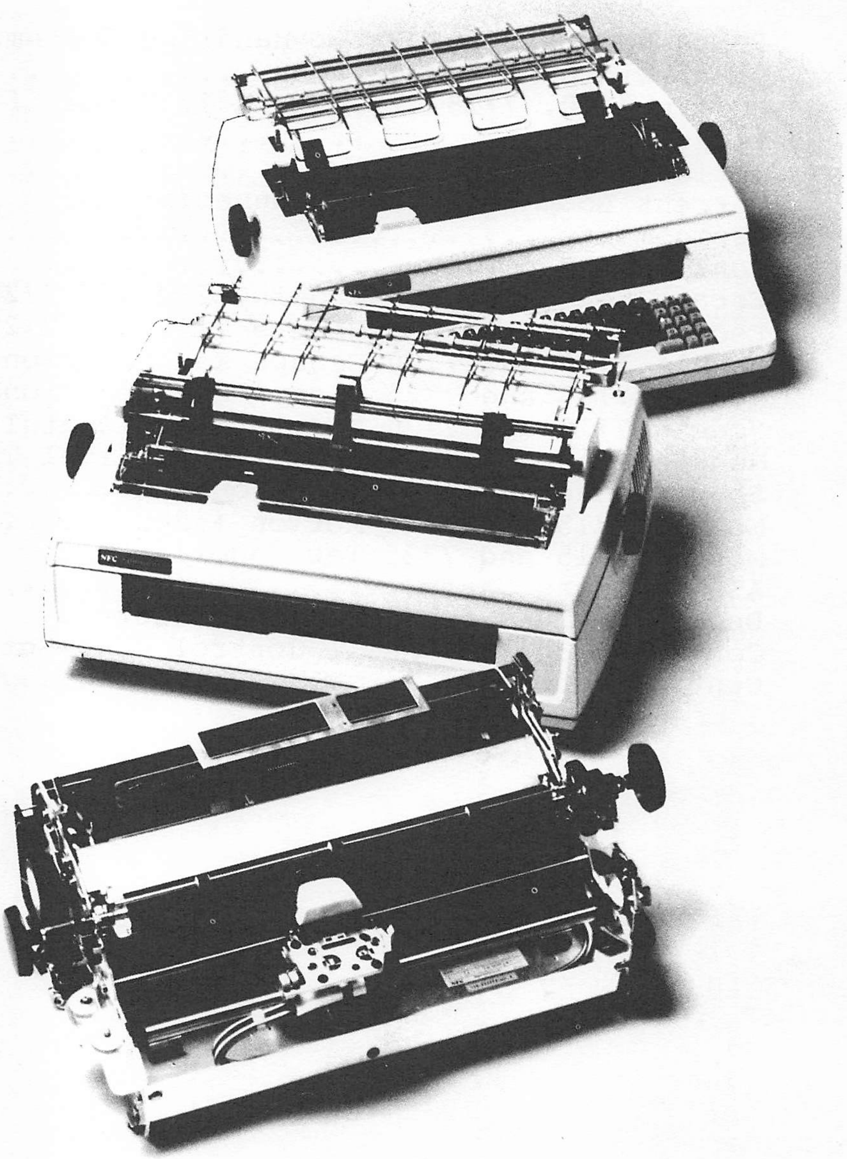


CHAPTER 1
GENERAL INFORMATION

This document describes four Spinwriter models:

- Model 7710 Receive Only (RO) ANSI Terminal,
- Model 7715 RO Diablo 1610 Replacement Terminal,
- Model 7720 Keyboard Send and Receive (KSR) ANSI Terminal, and
- Model 7725 KSR Diablo 1620 Replacement Terminal.

The Spinwriter is a microprocessor-controlled, serial impact printer that prints fully formed characters bidirectionally at a maximum rate of 55 characters per second (CPS). It is designed for applications where impeccable print quality and multiple copies are required. Because of its excellent print quality, the Spinwriter is the ideal output device for word processing and camera-ready printing applications.

The four models are a second-generation Spinwriter design that consolidates all logic electronics on a single printed circuit board (PCB), incorporates a faster, more precise digital positioning drive, and offers a highly efficient, compact, one-piece universal power supply.

Models 7710 and 7715 are RO printers for applications where keyboard input is not required. Models 7720 and 7725 have a built-in keyboard, complete with numeric keypad, to perform KSR functions. Options available include paper handling and a stand with a forms receiving tray. Interfaces include a serial RS-232-C interface and an optional current loop interface. These interfaces are described in detail in Chapter 3.

1.1 FEATURES

The Spinwriter terminals offer a wide range of standard and optional features that enable them to operate in most applications required of character printers.

1.1.1 Print Element

The small-diameter, low-mass print element is a low-cost, long-life, fiberglass reinforced plastic thimble. The thimble (see Figure 1-1) is produced by cylindrically arranging and molding 64 individual spring action fingers. Each finger can hold two characters, one above the other, for a maximum of 128 characters. With 125 or fewer characters on the thimble, the last characters printed are fully visible to the operator.

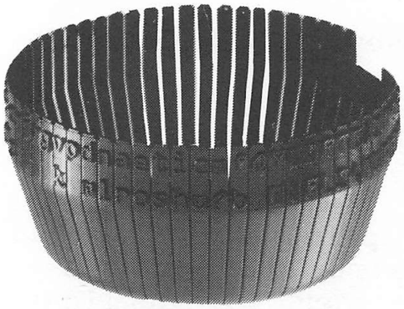


Figure 1-1 Print Thimble

Print thimble rotation is under microprocessor and digital position control for fast, accurate, bidirectional positioning. During operation, the print thimble turns horizontally and moves vertically to the selected print position. The print hammer mounted within the thimble strikes the specified finger, causing it to flex forward and press against the ribbon. This motion transfers the character image onto the paper in a manner similar to a typewriter.

The ribbon is contained in a cartridge that is easily replaced. Ribbons are available in black and red/black colors and come in fabric and multistrike film.

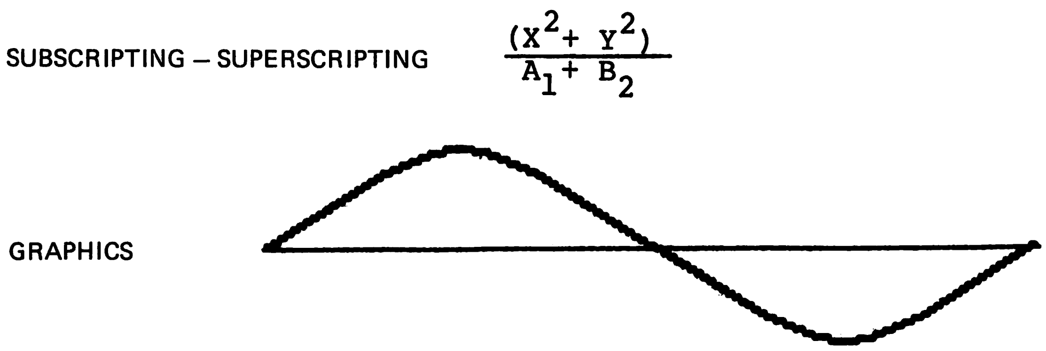
A microprocessor controls character printing intensity depending on the character selected. This feature extends print thimble life and produces high quality printed characters. Also, you can use an impression switch to further adjust the character impressions to produce the print intensity you want.

1.1.2 Spacing and Forms Positioning

Advanced motor control for carriage spacing and print element positioning, plus stepper motor control of the paper movement and ribbon drive systems result in exceptional print quality.

The Spinwriter offers 10 or 12 characters per inch (CPI or "pitch") or proportional spacing as standard features. The printer can print 136 positions per line (10 pitch) or 163 positions per line (12 pitch).

The superscripting, subscripting, graphing, and plotting capabilities (see Figure 1-2) of the Spinwriter offer further versatility. Character and line positions are directly addressable horizontally with a resolution of 1/120th of an inch and vertically with a resolution of 1/48th of an inch. This resolution produces 5,760 unique addressable points per square inch.



$$\frac{(X^2 + Y^2)}{A_1 + B_2}$$

Figure 1-2 Spinwriter Superscripting, Subscripting, and High Resolution Plotting

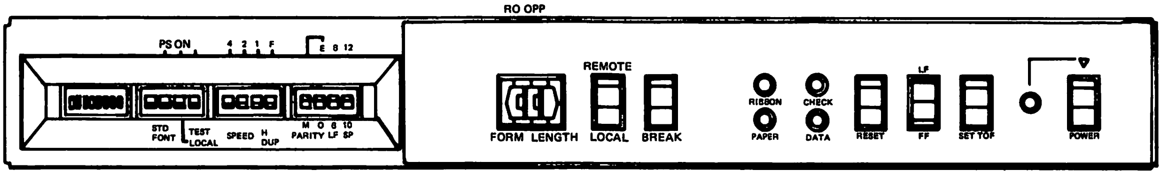
The maximum print rate is 55 CPS at 12 pitch. Bidirectional printing increases the printer throughput by eliminating time-consuming and nonproductive carriage returns.

Microprocessor control of these features allows absolute tabbing (tabbing directly to a specified print column or line without previously setting a tab stop) and motion minimization. The motion minimization feature combines a sequence of carriage and paper movement commands into a single operation, which moves the print thimble by the shortest path to the required position. This feature reduces the time consumed by the printer to execute these commands.

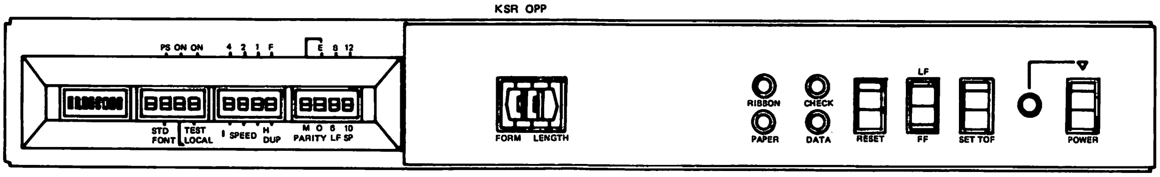
1.1.3 Operator Control Panel

The operator control panel has a POWER switch, an error RESET switch, and control switches for Line Feed/Form Feed (LF/FF), Set Top of Form (SET TOF), and FORM LENGTH. Lights are provided for ribbon out, paper out, check, and data. Several small switches are also on the front panel for space pitch (SP), line feed (LF), PARITY, duplex (DUP),

SPEED, TEST, local line feed (LOCAL LF), and FONT (proportional spacing or standard). On Models 7710 and 7715, there are two additional switches for BREAK and REMOTE/ LOCAL. The operator control panels are shown in Figure 1-3.



FOR MODELS 7710 AND 7715



FOR MODELS 7720 AND 7725

Figure 1-3 Operator Control Panels

1.1.4 Keyboard (Models 7720 and 7725 Only)

The keyboard has a typewriter-like keyboard and a 15-key numeric keypad. In addition to these keys, such function keys as BREAK, remote/local (LOCAL), uppercase only (UC ONLY), and automatic line feed (AUTO LF) are installed. All key entries are transmitted to the microprocessor in the same sequence that the keys are pressed. Thus, useful keyboard data is never lost, regardless of the speed of entry.

The keyboard transmits 7-bit ASCII code. Using the escape (ESC) sequence, nonstandard codes can be generated from the keyboard for special control functions, addressable horizontal and vertical tabbing, plus addressable spacing and paper advance control. Details on this coding are given in Chapter 4.

1.1.5 Communications Capability and Protocol

The standard communications interface in the Spinwriter transmits and receives serial, asynchronous EIA RS-232-C/ CCITT V.24 data through a modem or direct connection with a compatible communication multiplexer, controller, or central processing unit (CPU).

The Spinwriter communicates in half-duplex or full-duplex mode at rates from 110 to 1200 baud (9600 baud optional). Communications protocol includes ETX/ACK, X-ON/X-OFF, and REVERSE CHANNEL capabilities.

1.1.6 Interface Functions and Maintenance Aids

The Spinwriter incorporates additional interface functions such as Carrier Detect, Clear to Send, and Data Set Ready plus maintenance aids such as Hammer Drive Enable/Disable. These functions are controlled by a switch located on the main PCB. For detailed information, see Appendix A.

1.2 PAPER HANDLING

Rear feed and bottom feed are available for paper handling. Rear feed is similar to that for a typewriter - paper is inserted from the back of the printer. Any type of table can be used to hold the paper.

With optional bottom feed, the paper is fed up through the Spinwriter base. A bottom paper guide is included with a paper out sensor to facilitate paper loading and system operation. The paper must be stored in front of the Spinwriter and just below it. Bottom feed requires a table with a paper slot under the printer.

The paper can be advanced by a friction feed, pin feed, or tractor feed system. The parts required for each system are listed in Table 1-1. The paper widths that each feed system can accommodate are listed in Table 1-2.

Table 1-1 Parts Required for Paper Handling Systems

PARTS	FRICTION FEED	PIN FEED		TRACTOR FEED (VERTICAL & HORIZONTAL)		BIDIRECTIONAL TRACTOR FEED	CUT-SHEET FEEDER	TWIN FEEDER
	REAR	REAR	BOTTOM	REAR	BOTTOM	REAR		
Friction Platen	X	–	–	X	X	X	X	X
Friction* Attachment	*	–	–	–	–	–	–	–
Pressure Bail△	X						–	–
Silencer Hood	Long	Long	Long	Short+	Short+	Short	Short	Short
Paper Net (Guide)	Short	Long	Long	Short	–	Short	–	–
Pin Feed Platen*	–	X	X	–	–	–	–	–
Forms Tractors (Vertical)*	–	–	–	X	X	–	–	–
Forms Tractors (Horizontal)*	–	–	–	X	X	–	–	–
Bidirectional Forms Tractor*	–	–	–	–	–	X	–	–
Bottom Guide*	–	–	X	–	X	–	–	–
Front Inserter*	–	–	–	–	–	–	–	–
Cut-Sheet Feeder*	–	–	–	–	–	–	X	–
Twinfeeder*	–	–	–	–	–	–	–	X

X = Required
– = Not used
* = Options
+ = Use Long for horizontal tractor feed
△ = The pressure bail must be retracted when using the pin feed and tractor feed platens.

Table 1-2 Paper Width Accommodations

FEED DIRECTION	PAPER WIDTH
Rear Feed	Friction Feed Platen: 16 in. (maximum) Pin Feed Platen: 4 in. to 16 in. (maximum) (3.5 to 15.5 in. pin-to-pin) Forms Tractor Assembly: 3 in. to 16 in. (maximum) (2.5 in. to 15.5 in. pin-to-pin)
Bottom Feed	Pin Feed Platen: 4 in. to 16 in. (maximum) (3.5 in. to 15.5 in. pin-to-pin) Forms Tractor Assembly: 3 in. to 16 in. (maximum) (2.5 in. to 15.5 in. pin-to-pin)

1.3 OPTIONS

Options available for the Spinwriter terminals include forms handling equipment and a printer stand.

1.3.1 Forms Handling Equipment

The Spinwriter terminals come equipped with a friction feed platen as standard equipment. A number of other types of forms handling equipment are offered as options.

1.3.1.1 Friction Feed Platen

This NEC forms handling device is designed for applications where one- or two-part forms are used. For forms containing more than two parts, use one of the many NEC tractor-type devices.

1.3.1.2 Friction Attachment

This unit mounts inside the printer and guides paper around the friction feed platen. Its use helps eliminate the need for operator adjustment to line up the paper. This unit can only be used with friction feed.

1.3.1.3 Pin Feed Platen

The NEC pin feed platens are designed for those printing applications where one size continuous paper is used. Pin feed platens are offered in many widths. A tear bar is provided for demand document applications. Specify the width required by measuring the paper width from hole center to hole center.

1.3.1.4 Vertical Forms Tractor

The NEC forms tractor is a general purpose device designed for use in printing applications where many different sizes of continuous forms are required. It accommodates one- to seven-part forms.

1.3.1.5 Bidirectional Forms Tractor

The NEC bidirectional forms tractor is designed for continuous forms applications where reverse paper motion is often required. It engages paper on both sides of the platen for precise, trouble-free paper drive in either direction. One- to four-part forms can be accommodated.

1.3.1.6 Bottom Feed

This option feeds paper from the bottom of the Spinwriter when forms tractors are used. It is especially useful for forms control when multiple parts forms are used. A paper out switch comes as part of this option.

1.3.1.7 Cut-Sheet Guide

The cut-sheet guide features a friction attachment function and a paper detection function. The paper guide that must be installed is plastic and is larger than the standard paper guide.

1.3.1.8 Cut-Sheet Feeder

The cut-sheet feeder features a 200-sheet capacity as well as paper out and paper jam detection. Paper widths from 5.5 to 12 inches can be accommodated.

1.3.2 Printer Stand

An optional printer stand is available with a forms receiving tray for stacking printouts and a forms storage area. The stand is designed for rear or bottom paper feed.

1.4 SUPPLIES AND ACCESSORIES

Supplies and accessories include the many types of ribbons and print thimbles that are available from NEC.

1.4.1 Print Ribbon

Print ribbons are contained in easily replaceable ribbon cartridges. Single-color and two-color nylon ribbons are available as well as a multistrike film ribbon.

1.4.1.1 Single-Color Ribbon (Black)

This ribbon is made of nylon cloth and arranged in a continuous loop that can be used repeatedly. Average life of this ribbon is over 1.5 million impressions.

1.4.1.2 Two-Color Ribbon (Red/Black)

The two-color ribbon is also made of nylon cloth and arranged in a continuous loop. Average life of this ribbon is over 1 million impressions.

1.4.1.3 Multistrike Film Ribbon

Use the multistrike film ribbon when extremely sharp printed characters are required. Because this ribbon is not a continuous loop, it must be replaced after one pass. A ribbon end sensor detects the end of the ribbon and stops the Spinwriter. Life of the multistrike ribbon is approximately 180,000 impressions.

1.4.2 Print Thimble

The print thimble is a low cost, low mass, long life, fiberglass reinforced print element with 64 individual, spring action fingers. Two characters can be mounted on each finger, giving a total capacity of 128 characters. Contact the nearest NEC Information Systems, Inc. sales office for available fonts or special font requirements.

1.5 SPECIFICATIONS

The mechanical, electrical, environmental, and performance specifications for these four Spinwriter models are listed in Table 1-3.

Table 1-3 Models 7710, 7715, 7720, and 7725 Specifications

FEATURE	SPECIFICATION
Performance Specifications	
Print Speed	55 CPS at 12 pitch (maximum) With Serial Interface: 10 CPS @ 110 Baud, 30 CPS @ 300 Baud 15 CPS @ 150 Baud, 55 CPS @ 600 Baud 20 CPS @ 200 Baud, 55 CPS @ 1200 Baud
Print Line	136 columns at 10 pitch 163 columns at 12 pitch
Impression Control	3 steps by operator 8 steps internally by printer
Paper Width	16 inches maximum
Character Set	128 characters (maximum), fully-formed

Table 1-3 Models 7710, 7715, 7720, and 7725
Specifications (cont'd)

FEATURE	SPECIFICATION
Performance Specifications (cont'd)	
Copy Thickness Control	5-step switching by operator
Paper Thickness	Up to 0.027-inch
Paper Movement	Up or down
Carriage Return Time	400 milliseconds (maximum)
Horizontal Resolution	120 increments per inch
Horizontal Tabulation	Normal and addressable - right and left
Vertical Resolution	48 increments per inch
Vertical Tabulation	Normal and addressable - up or down
Line Feed Speed	4.22 inches per second (40 ms settling time)
Reverse Line Feed Speed	3.11 inches per second (40 ms settling time)
Spacing Speed	16 milliseconds at 12 pitch
Form Feed	1 to 99 lines (maximum)
Line Feed	6 or 8 lines per inch (forward/ reverse)
Test Print	Prints stored print test set
Serial Interface Specifications	
Compatibility	Electrically compatible with EIA RS-232-C and CCITT V.24
Communication	ASCII, half or full duplex
Error Detection	Even/odd parity Framing/overrun error detection
Transmission Rate	110, 150, 200, 300, 600, 1200, or 9600 Baud (optional)
Receive Buffer	256 characters

Table 1-3 Models 7710, 7715, 7720, and 7725
Specifications (cont'd)

FEATURE	SPECIFICATION
Serial Interface Specifications (cont'd)	
Transmit Buffer	16 characters
Protocol	ETX/ACK or X-ON/X-OFF REVERSE CHANNEL
Power Requirements	
Input Power	115 Vac, ±15%, 3.5 amps, 50/60 Hz +5%, -3% or 230 Vac, ±15%, 2 amps, 50/60 Hz, +5%, -3%
	Weight
Models 7710 and 7715 (RO)	45.5 pounds (20.7 kg)
Models 7720 and 7725 (KSR)	51 pounds (23.3 kg)
Environmental Specifications	
Operating Noise Level	60 dBa with cover 67 dBa without cover
Temperature	
Operating	40°F to 100°F (5°C to 38°C)
Storage	-22°F to 158°F (-30°C to 70°C)
Humidity (Without Condensation)	
Operating	10% to 85%
Storage	10% to 95%
Altitude	
Operating	Sea Level to 10,000 ft
Storage	Sea level to 25,000 ft

1.6 FEDERAL COMMUNICATIONS COMMISSION WARNING

The following warning is required for all computing devices by FCC regulations.

WARNING

> This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

CHAPTER 2
INSTALLATION

This chapter describes the system requirements and installation procedures that you should follow to install the Spinwriter.

2.1 SYSTEM REQUIREMENTS

The Spinwriter is easily and quickly installed. The considerations are the operating environment, available space, and power requirements.

2.1.1 Operating Environment

Install the Spinwriter in a clean, dust-free environment. The Spinwriter operates reliably in a typical environment of 40° to 100° F with a relative humidity of 10% to 85% without condensation.

2.1.2 Space and Dimensions

Little space beyond the overall dimensions of the printer is required. Allow a minimum of 6 inches on all sides for proper ventilation. See Figures 2-1 through 2-4 for the Spinwriter dimensions.

2.1.3 Power Requirements

Power supplied to the Spinwriter should be within the range of 97 to 132 Vac, 47 to 63 Hz, or optional 195 to 265 Vac, 47 to 63 Hz. The Spinwriter consumes approximately 180 watts.

2.2 INSTALLATION PROCEDURES

Installation of the Spinwriter consists of inspection, power on, initialization, and self-test.

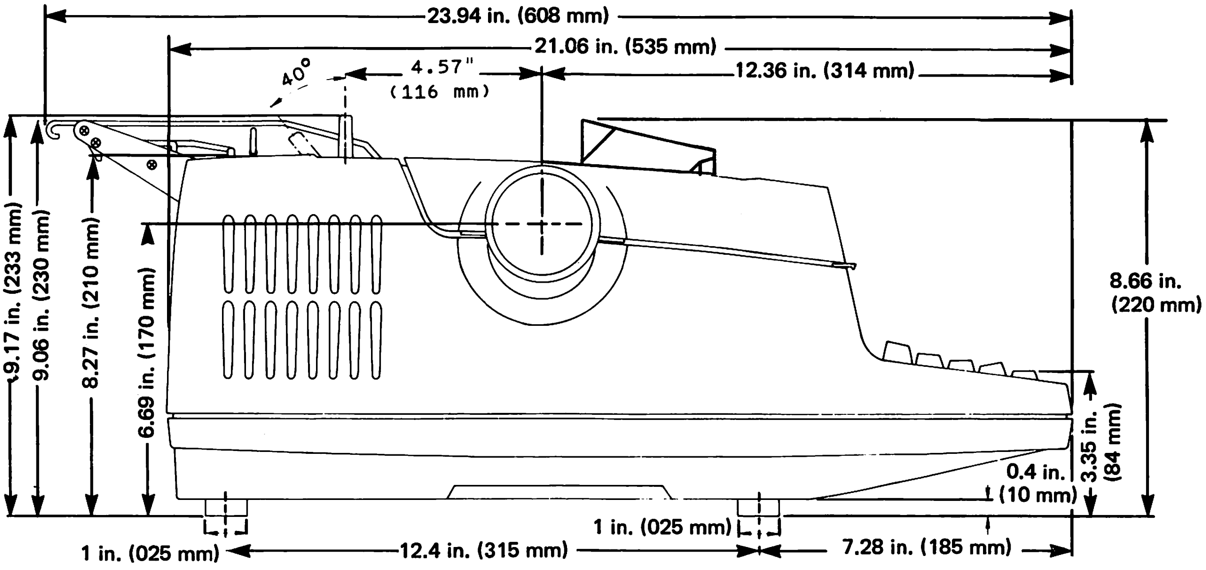


Figure 2-1 Models 7720 and 7725 Spinwriter Dimensions - Left Side View

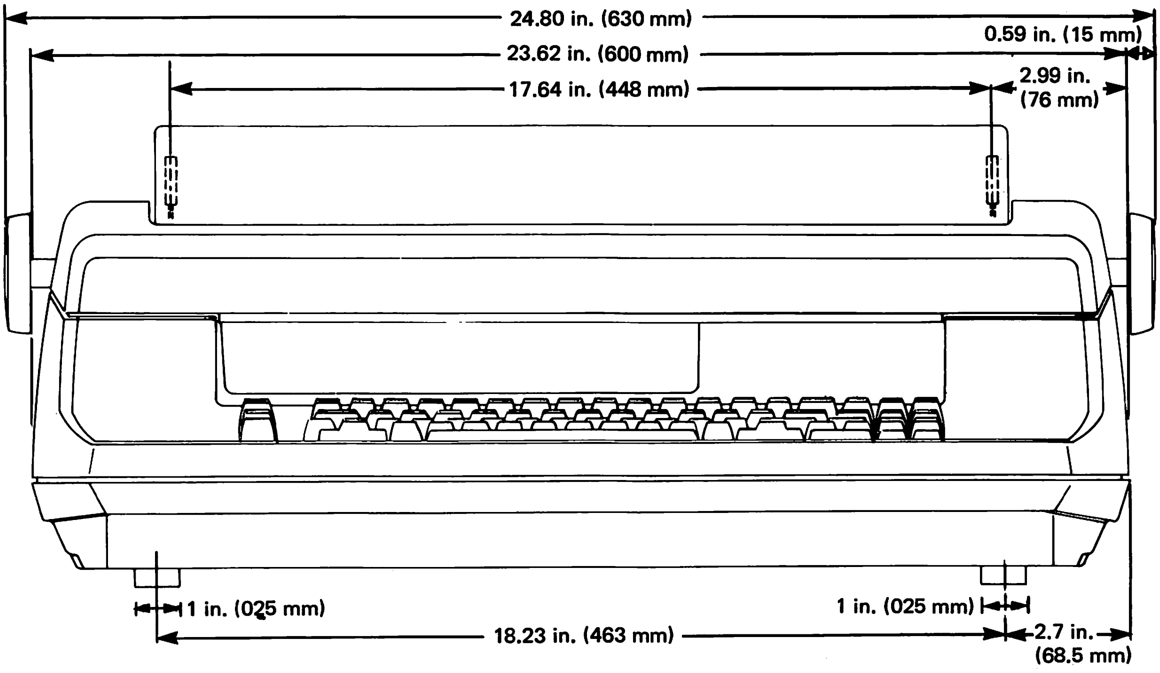


Figure 2-2 Models 7720 and 7725 Spinwriter Dimensions - Front View

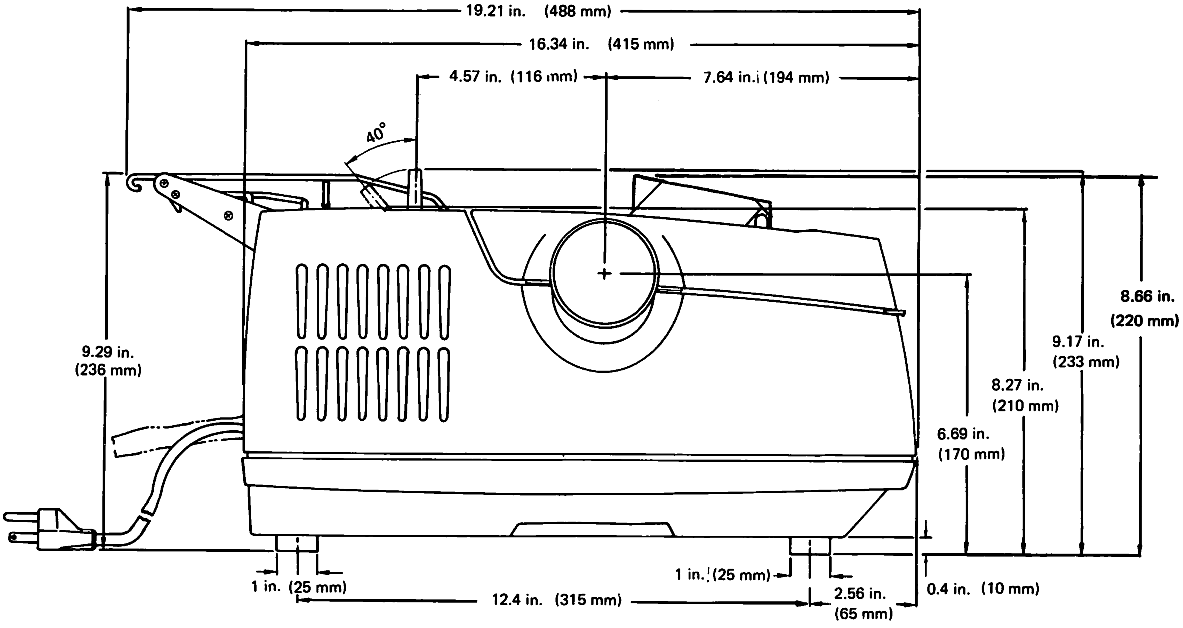


Figure 2-3 Models 7710 and 7715 Spinwriter Dimensions - Left Side View

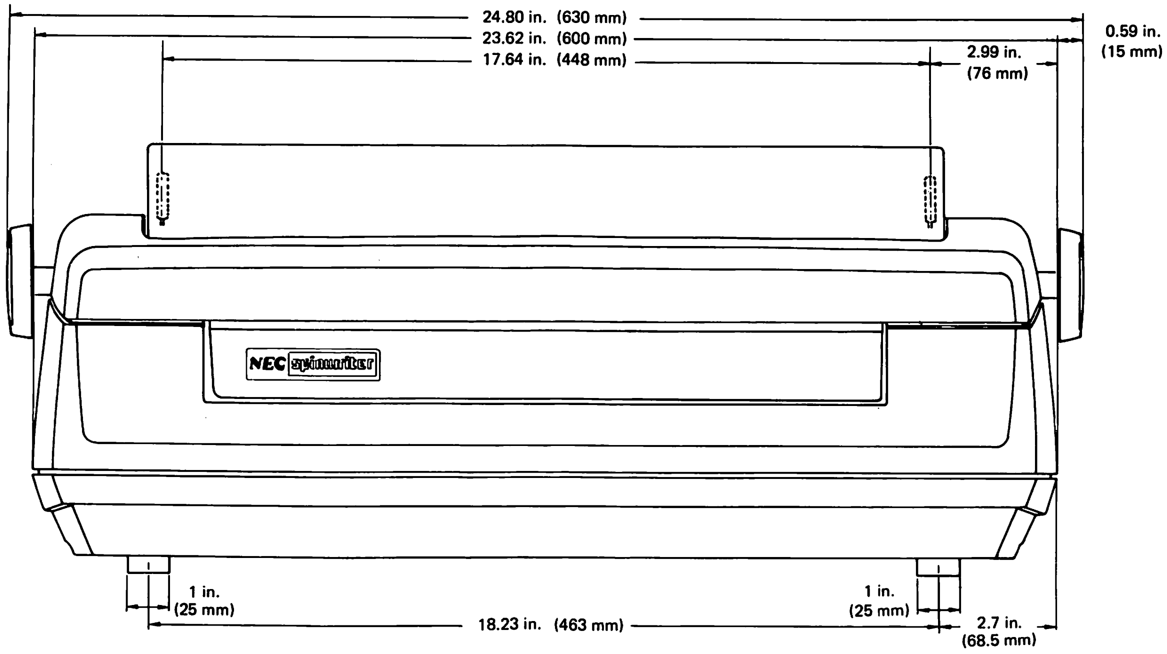


Figure 2-4 Models 7710 and 7715 Spinwriter Dimensions - Front View

2.2.1 Inspection

Inspect the Spinwriter as follows.

a. Make sure that the print carriage retaining ring has been removed (see the unpacking instructions shipped with the unit).

b. Inspect the printer for any damage.

c. Raise the top cover and remove the platen. On older Spinwriters, unlatch the release levers (see Figure 2-5a). On newer Spinwriters, remove the screws (see Figure 2-5b). Lift off the middle cover.

d. Make sure all PCBs are properly seated and all cables are connected.

e. Inspect for any loose hardware or extraneous parts or materials.

f. Replace the middle cover and platen.

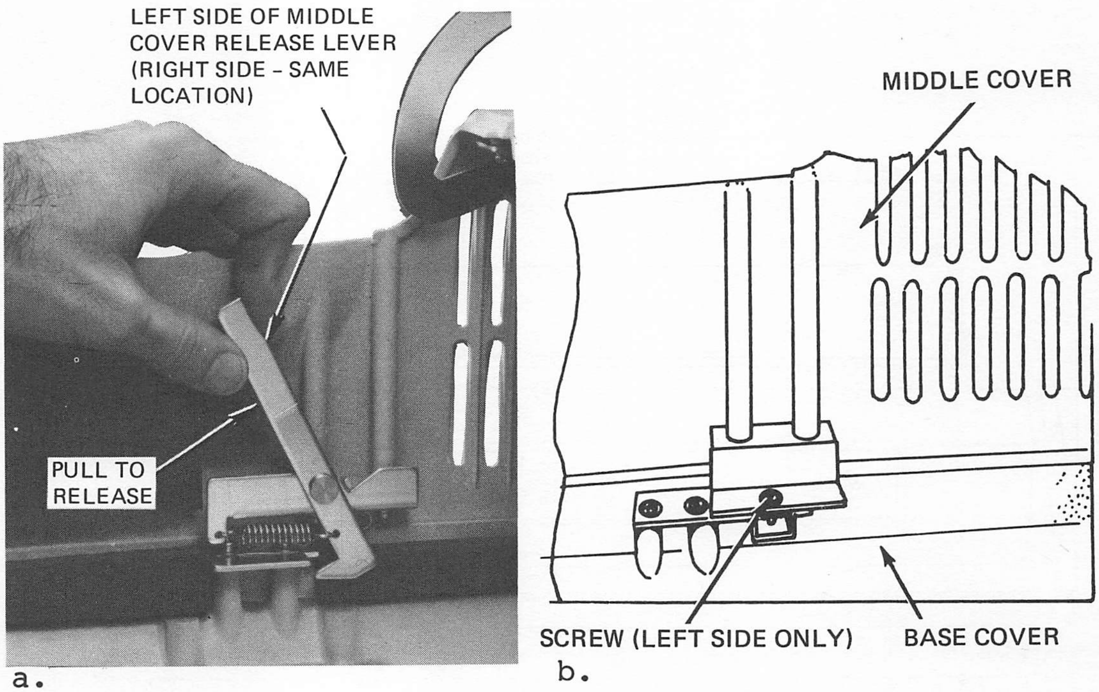

LEFT SIDE OF MIDDLE COVER RELEASE LEVER (RIGHT SIDE - SAME LOCATION)
PULL TO RELEASE
a.
MIDDLE COVER
SCREW (LEFT SIDE ONLY)
BASE COVER
b.

Figure 2-5 Middle Cover Removal

2.2.2 Power On and Initialization Test

This test checks ac and dc power distribution, reset, and printer initialization.

a. Check that the ac power switches are OFF. These switches are located at the back of the printer and on the operator control panel.

NOTE

> Power on to the printer can be controlled by either of the two switches. However, both switches must be OFF to remove power.

b. Connect the printer power cord to the outlet.

c. Install print thimble and ribbon.

d. Set the front panel power switch to ON and look for the following conditions:

- The fan operates.
- The print carriage moves to the first print position.
- The print thimble turns to the "home" position.
- The ribbon is retracted to the down position.

e. If any of these conditions do not function correctly, immediately push the power switch to OFF, disconnect the power cord, and call the service representative.

f. If these conditions are met, proceed to the next test. Push the power switch to OFF.

2.2.3 Self-Test

Self-test consists of a self-printing test and a self-function test. The self-printing test prints a stored message line by line to allow you to check the printer line feed and ribbon feed operations as well as printed character quality. The self-function test slowly runs a stored sequence of functions one by one to allow you to check Spinwriter operation.

2.2.3.1 Models 7710 and 7715 (RO) Self-Printing Test

Use the following procedure to test the printing of the Models 7710 and 7715.

a. Set both power switches to OFF.

b. Insert paper into the printer. Use paper 16 inches wide.

c. Dial 13 into the FORM LENGTH rotary switches.

d. On those models so equipped, set the REMOTE/LOCAL switch to LOCAL.

e. Set the TEST switch on the control panel to ON.

f. Turn on the printer power. The printer should initialize and print the test pattern repetitively. Select character spacing of 10 or 12 pitch and line spacing of 6 or 8 lines per inch using the SP and LF switches on the operator control panel.

g. Run the test pattern for five minutes. Turn off the power, remove the printout, and examine it for the following characteristics:

   - fully formed characters,
   - proper line feed and ribbon feed operations, and
   - print quality.

2.2.3.2 Models 7710 and 7715 (RO) Self-Function Test

Use the following procedure to function test the Spinwriter.

a. Turn off the power.

b. Insert paper into the printer. Use paper 16 inches wide.

c. Dial 00 into the FORM LENGTH rotary switches.

d. On those models so equipped, set the REMOTE/LOCAL switch on the control panel to LOCAL.

e. Set the TEST switch on the control panel to ON.

f. Turn on the power. The printer should initialize and execute the following functions in sequence.

   - Horizontal Tab (every 32 columns), Alarm, and Carriage Return

   - Thimble Rotation (moves right each 16 characters and then left)
   - Thimble Up and Down (twice)
   - Ribbon Change (twice)
   - Line Feed (3 lines)
   - Reverse Line Feed (3 lines)
   - Prints the message "PRINTER READY" and does a line feed and carriage return

   The interval between each function test is about 1 to 2 seconds.

g. Run the self-function test for five minutes and monitor the operation of the Spinwriter. Turn off the power.

2.2.3.3 Models 7720 and 7725 (KSR) Self-Printing Test

Use the following procedure to test the printing of the Models 7720 and 7725.

a. Turn off the power.

b. Insert paper into the printer. Use paper 16 inches wide.

c. Dial 13 into the FORM LENGTH rotary switches.

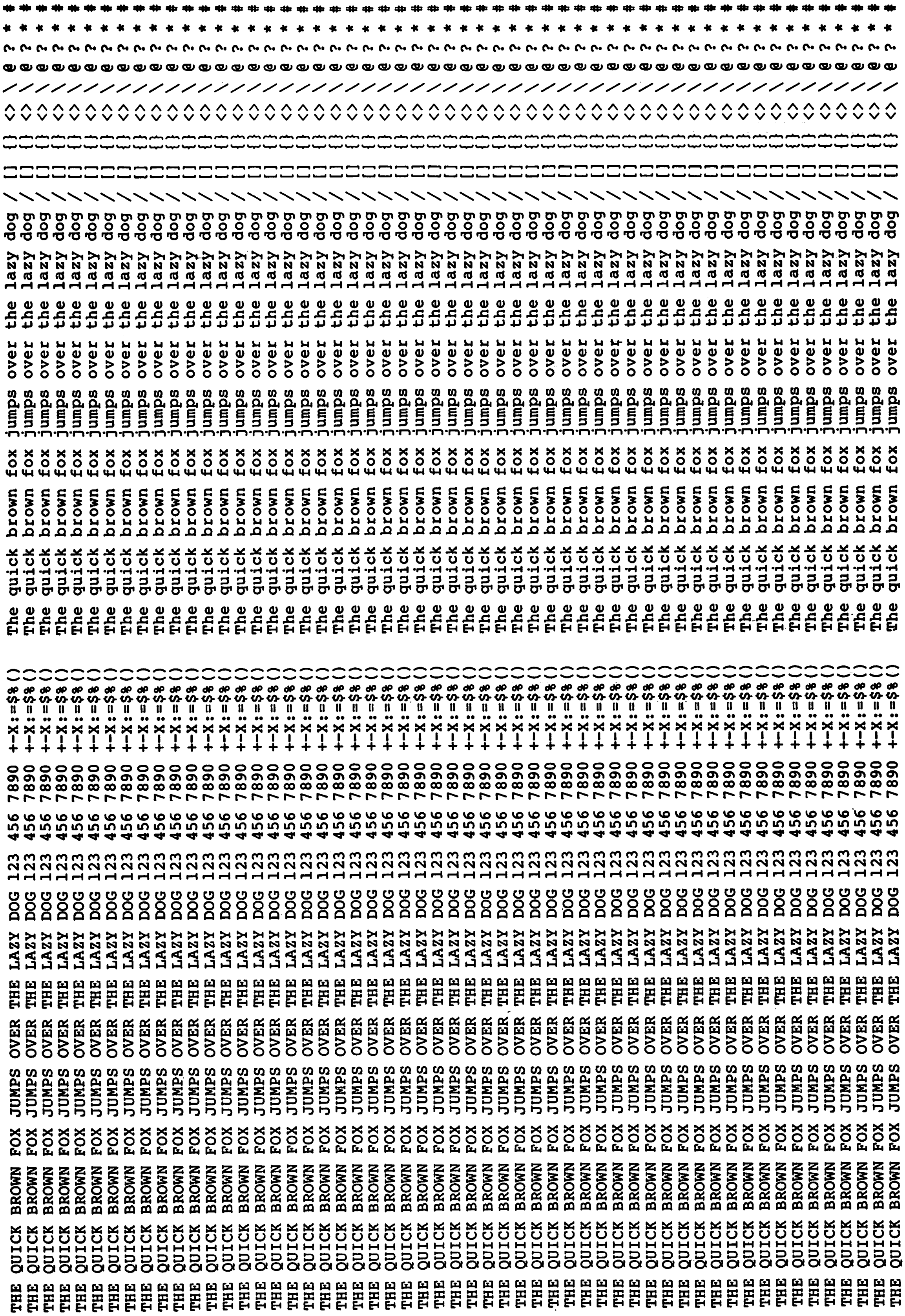
d. Press the LOCAL key on the keyboard.

e. Set the TEST switch on the control panel to ON.

f. Turn on the power. The printer should initialize and repetitively print the test pattern (see Figure 2-6).

g. Run the test pattern for five minutes. Turn off the power, remove the printout, and examine it for these characteristics:

   - complete character set per specification,
   - proper line feed and ribbon feed operations, and
   - print quality.



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THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123 456 7890 +-X:=$%()   The quick brown fox jumps over the lazy dog \  []  {} <> / @ ? * #
```

Figure 2-6 Typical Self-Test Pattern

2.2.3.4 Models 7720 and 7725 (KSR) Self-Function Test

Use this procedure to function test the Models 7720 and 7725.

a. Turn off the power.

b. Insert paper into the printer. Use paper 16 inches wide.

c. Dial 00 into the FORM LENGTH rotary switches.

d. Press the LOCAL key on the keyboard.

e. Set the TEST switch on the control panel to ON.

f. Turn on the power. The printer should initialize and execute the following functions in sequence.

   - Horizontal Tab (every 32 columns), Alarm, and Carriage Return
   - Thimble Rotation (moves right each 16 characters and then left)
   - Thimble Up and Down (twice)
   - Ribbon Change (twice)
   - Line Feed (3 lines)
   - Reverse Line Feed (3 lines)
   - Prints the message "PRINTER READY" and does a line feed and carriage return

   The interval between each function test is about 1 to 2 seconds.

g. Run the self-function test for five minutes and monitor the operation of the Spinwriter. Turn off the power.

2.2.4 Models 7720 and 7725 (KSR) Keyboard Check

Use this procedure to check the keyboard of Models 7720 and 7725.

a. Turn off the power.

b. Insert paper into the printer.

c. Press the LOCAL key on the keyboard.

d. Turn on the power.

e. Press each of the keys and be sure that the printer responds correctly for each key operation.

Three-character sequences are an extension of horizontal tab, vertical tab, character spacing, and forms advance length. They are included in the following descriptions.

4.6.1 Models 7710 and 7720 Carriage Movement Control

The codes that affect Models 7710 and 7720 carriage movement are described in the following sections.

4.6.1.1 Space (SP)

On receipt of the SP code, the Spinwriter carriage spaces accordingly. You select the space for 1/10th or 1/12th of an inch using the SP switch on the operator control panel. Spacing does not operate beyond the right margin. In the reverse print mode, SP moves the carriage one print position to the left.

4.6.1.2 Back Space (BS)

On receipt of a BS code, the Spinwriter carriage back spaces. You select the back spaces for 1/10th or 1/12th of an inch. Back spacing does not operate beyond the left margin. In the reverse print mode, BS moves the carrage one print position to the right.

4.6.1.3 Carriage Return (CR)

Receipt of a CR code causes the carriage to move to the left margin. It also causes a line feed if the AUTO LF key is pressed. Carriage Return also restores Reverse Print to Forward Print.

4.6.1.4 Normal Horizontal Tab

Use CTRL I for normal tabbing. Move the carriage to the tab positions you want and press keys ESC 1 for each tab. Execute tabbing with control code HT or by pressing the TAB key on the keyboard.

Clear individual horizontal tabs or all tabs with key sequence ESC 2 (see Appendix B). Clear all horizontal tabs with key sequence ESC 7.

4.6.1.5 Absolute Horizontal Tab

Absolute horizontal tabbing does not require preset tab stops. It allows positioning the carriage directly to any of 163 print positions from any other position.

Perform absolute tabbing using a 3-character escape sequence. The sequences are listed in Table B-3. For example, to tab directly to horizontal position 90, enter the following sequence on the Models 7710 and 7720.

ESC (First character)
R (Second character)
Y (Third character)

4.6.1.6 Right Margin, Left Margin

Set the right margin at the present print position with ESC J (j).

On receipt of ESC K (k), the right margin is reset automatically to the extreme right print position (for 10 pitch at 136; for 12 pitch at 163.

Set the left margin to the present print position with ESC M (m).

On receipt of ESC O (o), the left margin is reset to the extreme left print position (the first print position).

4.6.1.7 Reverse Print, Forward Print

Initiate reverse print mode with ESC< . In this mode, the characters are printed as the carriage moves from right to left. The paper feed codes and HT are executed normally.

Return to forward print mode (left to right) with the sequence ESC > or a carriage return (CR).

4.6.1.8 Spacing Control

Using a 3-character ESC sequence listed in Table B-5, you can control the horizontal spacing in increments of 1/120th of an inch (15/120th of an inch maximum).

4.6.1.9 Auto Bidirectional Printing

The printer will perform auto bidirectional printing if all of the following conditions exist.

- Auto bidirectional printing is enabled.
- The actual printing is at least one line behind print-queued data.
- The line to be printed contains fewer than 256 characters.

- There are no ESC sequences between the first printable character and the last one in the line.

If any of the above conditions do not exist, the printer will perform forward printing for that line.

ESC (enables the auto bidirectional mode. ESC) disables it.

NOTE

This mode is enabled at power on.

4.6.2 Models 7710 and 7720 Paper (Platen) Movement Control

The codes that affect Models 7710 and 7720 paper movement are described in the following sections.

4.6.2.1 Format Mode

Inhibit the control codes for paper (platen) movement (LF, VT, FF, REVERSE LF) with the format mode, ESC ?. However, the line feed counter continues to function and to respond to input LF commands. This feature allows you to set vertical tab stops, FF, and TOF without paper movement. The sequence ESC @ or` resets the format mode.

4.6.2.2 Line Feed (LF)

When the LF code is received, the selected line feed increment is performed. Select the line feed for 6 or 8 lines per inch using the LF switch on the operator control panel.

4.6.2.3 Reverse Line Feed

When ESC 9 is received, the platen is reversed by one line. The distance the paper moves is determined by the LF switch on the operator control panel or by the preprogrammed vertical pitch setting.

4.6.2.4 Half Line Feed

Key sequence ESC : causes a half line feed.

4.6.2.5 Negative Half Line Feed

Key sequence ESC ; causes the paper to move a half line downward.

4.6.2.6 Form Feed, Form Length

When the FF code is received, the paper is advanced to the top of the next page or TOF. Set the number of lines you want (99 maximum) into the FORM LENGTH switches and press SET TOF on the operator control panel.

The form length and TOF can also be set using the ESC sequence as follows.

- Press ESC 7.
- Press ESC ? (set format mode to inhibit paper movement).
- Issue the LF (line feed) command as many times as the desired number of lines (if 66 lines, issue LF 66 times).
- Press ESC @ or` (reset format mode).
- Press ESC L (establishes FF length).

Sending an FF command advances the paper to the TOF just established.

Key sequence ESC 7 clears the FF length established by pressing SET TOF or by the ESC L sequence.

4.6.2.7 Normal Vertical Tab

Use ESC 5 for vertical tabbing. Move the paper (platen) to the tab positions you want and press keys ESC 5 for each tab. Execute tabbing with control code VT.

Key sequence ESC 6 clears individual vertical tabs. Key sequence ESC 7 clears all tabs.

4.6.2.8 Relative Vertical Tab

Relative vertical tabbing does not require preset tabs. It allows positioning the paper to any of 63 vertical (line) positions forward or reverse from any other position.

Use a 3-character escape sequence for relative vertical tabbing. The sequences are listed in Table B-4. For example, to tab forward 20 lines, enter the following sequence (see Table B-4).

```
ESC (First character)
  Z (Second character)
  T (Third character)
```

To return to the original position (reverse), enter the following sequence.

```
ESC
  X
  T
```

4.6.2.9 Forms Advance Control

Using the ESC sequence, you can control the form advance in increments of 1/48th of an inch (16/48ths of an inch maximum). The 3-character escape sequences for this feature are listed in Table B-5.

4.6.3 Models 7710 and 7720 General Control

The codes that affect Models 7710 and 7720 red/black printing and read and store operator control switches are described in the following sections.

4.6.3.1 Red/Black Printing

The printer initializes for printing in black. To print in red, press ESC 3. To again print in black, press ESC 4.

4.6.3.2 Read and Store Operator Control Switches

The sequence ESC = stores the settings of the spacing (SP) switch (10 or 12), line feed (LF) switch (6 or 8), and the FORM LENGTH switch in internal registers.

4.6.3.3 Graphics

Key sequence ESC . (period) sets the graphics mode, and sequence ESC / resets the graphics mode. In graphics mode, carriage movement is completely separated from printing. Printing a character does not automatically move the carriage. The carriage is moved only by executing a tab, space, carriage return, or back space. The tab commands operate the same as they do in normal mode. However, the space and back space commands move the carriage only 1/60th of an inch instead of the horizontal index selected.

Paper movement commands can be used extensively in graphics mode. Vertical tab (VT) and FF operations are unchanged, but the LF and ESC 9 commands cause only 1/48th of an inch of paper movement.

4.6.4 Models 7710 and 7720 Word Processing Enhancements

The word processing enhancements consist of four modes, program mode (ASCII), auto bold mode, auto shadow mode, and auto underscore mode.

4.6.4.1 Program Mode (ASCII)

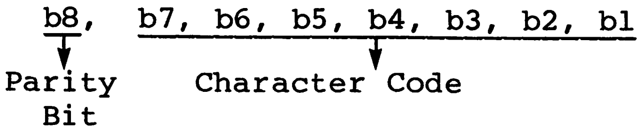
Use the program mode for printing a character with proportional spacing. Sequence ESC E sets the program mode. Sequence ESC G (set normal mode) or ESC & (cancel all WP modes) reset this mode. In program mode, the reserved data functions as follows.

PRINTABLE CHARACTER CODES

Printable character codes are a 2-byte command. The first byte specifies character codes by ASCII, and the second byte gives spacing pitch and hammer impression level data.

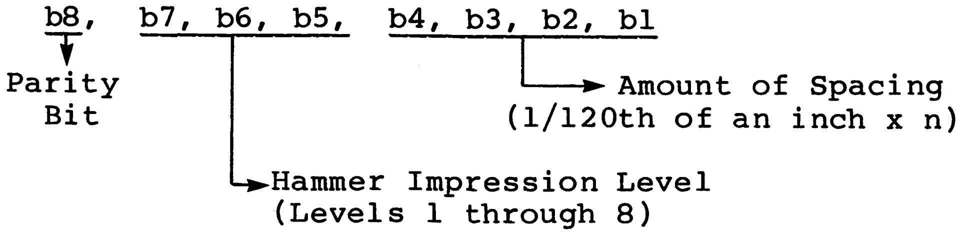
- First Byte

  The function of the SP code (20H) as a first byte is described later in this section. A DEL code (7FH) performs the same function that a NUL code does. The format of the first byte follows.



- Second Byte

  If the second byte is the NUL code (00H) or DEL code (7FH), it is ignored and the next data is recognized as the second byte data. The format of the second byte follows.



b7	b6	b5	LEVEL
0	0	0	1 (weak)
0	0	1	2
0	1	0	3
0	1	1	4
1	0	0	5
1	0	1	6
1	1	0	7
1	1	1	8 (strong)

SP CODE

If the SP code is in the first byte, bits 1 through 7 of the second byte indicate the amount of spacing.

- First Byte

  SP Code

- Second Byte

```
            b8,  b7, b6, b5, b4, b3, b2, bl
            ─┬─  ──────────────┬──────────────
             ↓                 ↓
          Parity        Amount of Spacing
           Bit          (1/120th to 126/120ths of an inch)
```

BS CODE

The BS code causes reverse motion equal to the last forward motion command. Repeated BS codes cause repeated reverse motion.

CAN CODE

The CAN code is a 2-byte command. It is handled the same as the printable character codes described earlier in this section.

CONTROL CODES

All control codes, including ESC sequences, cause the same operation in program mode as they do in normal mode (excluding the BS code and the CAN code).

NOTE

> A code following a printable character code is always recognized as a bit pattern that specifies the amount of spacing and hammer impression level. Control codes and the NUL code cannot work if they follow a printable character code.

4.6.4.2 Auto Bold Mode

Sequence ESC * sets the auto bold mode. Subsequent printable characters are struck twice with no intervening carriage motion, but the normal ribbon advance occurs between character strikes. A carriage return (excluding auto return) or any one of the sequences ESC , (comma), ESC +, or ESC & resets the auto bold mode.

4.6.4.3 Auto Shadow Mode

Key sequence ESC + sets the auto shadow mode. Subsequent printable characters are struck twice with 1/120th of an inch carriage movement and normal ribbon advance between character strikes. A carriage return (excluding auto return) or any one of the sequences ESC , (comma), ESC *, or ESC & resets the auto shadow mode.

4.6.4.4 Auto Underscore Mode

Key sequence ESC - (minus) sets the auto underscore mode. The present carriage position is stored in memory as the start position. When the carriage reaches the end position, it returns to the start location and underscores the area between it and the end position. Sequences ESC ' or ESC & clear the auto underscore mode.

4.6.5 Models 7715 and 7725 Carriage Movement Control

The codes that affect Models 7715 and 7725 carriage movement are described in the following paragraphs.

4.6.5.1 Space (SP)

On receipt of the SP code, the Spinwriter carriage spaces accordingly. You select the space for 1/10th or 1/12th of an inch using the SP switch on the operator control panel. Spacing does not operate beyond the right margin. In the reverse print mode, SP moves the carriage one print position to the left.

4.6.5.2 Back Space (BS)

On receipt of a BS code, the carriage back spaces. You set the back space for 1/10th or 1/12th of an inch. Back spacing does not operate beyond the left margin. In the reverse print mode, BS moves the carriage one print position to the right.

4.6.5.3 Carriage Return (CR)

When the CR code is received, the carriage moves to the left margin. It also causes a line feed if you press the AUTO LF key. The CR code also restores Reverse Print to Forward.

4.6.5.4 Normal Horizontal Tab

Use CTRL I for normal tabbing. Move the carriage to the tab positions you want and press keys ESC 1 for each tab. Execute tabbing with control code HT or by pressing the TAB key on the keyboard.

Clear individual horizontal tabs or all tabs with key sequence ESC 2 (see Appendix B). Clear all horizontal tabs with key sequence ESC 7.

4.6.5.5 Absolute Horizontal Tab

Absolute horizontal tabbing does not require preset tabs. It allows positioning the carriage directly to any of 163 print positions from any other position.

To perform absolute tabbing, press an ESC character and the horizontal command (HT) followed by the ASCII character whose decimal value indicates the print position you want (see Table B-7). For example, to set the horizontal tab at 65, press keys ESC, CTRL I, and A.

4.6.5.6 Right Margin, Left Margin

When ESC 0 is received, the right margin is set at the present print position. When ESC 9 is received, the left margin is set to the present print position.

4.6.5.7 Reverse Print, Forward Print

The sequence ESC 6 initiates the reverse print mode, which prints characters as the carriage moves from right to left. The paper feed codes and HT are executed normally.

Return to forward print mode (left to right) with the sequence ESC 5 or a carriage return (CR).

4.6.5.8 Define Horizontal Motion Index

The Horizontal Motion Index (HMI) is the number of 1/120th of an inch increments that the carriage moves when spacing or after printing a character. Minimum HMI is 0 (no spacing) and maximum is 125. Execute HMI with a 3-character sequence ESC US (n), where (n) represents an ASCII character whose decimal value is one greater than the number of increments the carriage will move. For example, to set HMI at 10, press keys ESC, CTRL, SHIFT, _ (underline), and CTRL K (see Table B-6).

4.6.5.9 Auto Bidirectional Printing

The printer will perform auto bidirectional printing if all of the following conditions exist.

- Auto bidirectional printing is enabled.
- The actual printing is at least one line behind print-queued data.
- The line to be printed contains fewer than 256 characters.
- There are no ESC sequences between the first printable character and the last one in the line.

If any of the above conditions do not exist, the printer will perform forward printing for that line.

ESC / enables the auto bidirectional mode. ESC \ disables it.

NOTE

This mode is enabled at power on.

4.6.6 Models 7715 and 7725 Paper (Platen) Movement Control

The codes that affect Models 7715 and 7725 paper movement are described in the following paragraphs.

4.6.6.1 Line Feed (LF)

When the LF code is received, the selected line feed increment is performed. Use the LF switch on the operator control panel to select the line feed for 6 or 8 lines per inch.

4.6.6.2 Reverse Line Feed

When ESC LF is received, the platen is reversed by one line. The distance the paper moves is determined by the LF switch on the operator control panel or by the preprogrammed vertical pitch setting.

4.6.6.3 Half-Line Feed

When ESC U is received, a half-line feed is performed.

4.6.6.4 Negative Half-Line Feed

When ESC D is received, a negative half-line is performed.

4.6.6.5 Absolute Vertical Tab

Using absolute vertical tab, the form can be moved directly to any of the first 126 lines on the page from any other line on the page. This action is accomplished by providing a 3-character sequence ESC VT (n), where the (n) represents an ASCII character whose decimal value is equal to the number of the line on the form to be reached (the top of form setting is line 1) (see Table B-7). For example, to set the vertical tab at line 52, press keys ESC, CTRL with K, and 4.

4.6.6.6 Define Vertical Motion Index

Vertical Motion Index (VMI) is the number of 1/48th of an inch increments the platen (paper) moves for each line feed or negative line feed. Minimum VMI is 0 and maximum is 125. Execute the VMI with a 3-character sequence ESC RS (n), where (n) represents an ASCII character whose decimal value is one greater than the number of increments the paper will move. For example, to set VMI at 53, press keys ESC, CTRL, SHIFT, +, and 6 (see Table B-6).

4.6.7 Models 7715 and 7725 General Control

The codes that affect Models 7715 and 7725 red/black printing and graphics are described in the following sections.

4.6.7.1 Red/Black Printing

The printer initializes for printing in black. To print in red, press ESC A. To again print in black, press ESC B.

4.6.7.2 Graphics

When ESC 3 is received, graphics mode is set; ESC 4 restores normal mode. While in the graphics mode, carriage movement is completely separate from printing; that is, printing a character does not automatically move the carriage. The carriage is moved only by executing a tab, space, carriage return, or back space.

The tab commands operate the same as they do in normal mode. In graphics mode, however, the space and back space commands move the carriage only 1/60th of an inch instead of the horizontal index selected.

Paper movement commands can be used extensively in graphics. Vertical tab (VT) and FF operations are unchanged, but LF and ESC LF cause only 1/48th of an inch of paper movement instead of the full line (VMI) movement performed in normal mode.

4.6.8 Procedure to Access 128 Characters

The 128 characters on the print thimble can be accessed by using the Shift Out/Shift In (SO/SI) control codes as follows:

a. Ninety-four characters can be accessed by using the 94 ASCII codes (21 through 7E).

b. The remaining 34 characters (for a total of 128 characters) can be accessed by using Control N (SO) followed by ASCII codes 3C, 3E, and 40 through 5F.

NOTE

> In the case of dual font thimbles, ASCII codes for the uppercase A to Z (41 through 5A) will enable the secondary alphabet characters.

c. Control O (SI) enables printing of the standard 94 characters.

4.6.9 Models 7715 and 7725 Word Processing Enhancements

The word processing enhancements for Models 7715 and 7725 consist of four modes, program mode, auto bold mode, auto shadow mode, and auto underscore mode.

4.6.9.1 Program Mode (ASCII)

The program mode is for printing a character with proportional spacing. Key sequence ESC SO M sets the program mode. Sequence ESC SI (set normal mode) or ESC X (cancel all WP modes) resets the program mode. In this mode, the received data functions as follows.

PRINTABLE CHARACTER CODES

The printable character codes are all 2-byte commands. The first byte specifies character codes in ASCII, and the second byte provides spacing pitch and hammer impression level. The function of the SP code is described later in this section. A DEL code (7FH) performs the same function as a NUL code.

- First Byte

```
  b8,  b7, b6, b5, b4, b3, b2, b1
   |              |
Parity    Character Code
 Bit
```

- Second Byte

```
  b8,  b7, b6, b5,  b4, b3, b2, b1
   |       |             |
Parity     |             |_Amount of Spacing
 Bit       |               (1/120th of an inch x n)
           |
           |_Hammer Impression Level
             (Levels 1 through 8)
```

b7	b6	b5	LEVEL
0	0	0	1 (weak)
0	0	1	2
0	1	0	3
0	1	1	4
1	0	0	5
1	0	1	6
1	1	0	7
1	1	1	8 (strong)

If the second byte is the NUL code (00H) or DEL code (7FH), it is ignored and the next data is recognized as the second byte data.

SP CODE

If the SP code is in the first byte, bits 1 through 7 of the second byte indicate the amount of spacing.

- First Byte

  SP Code

- Second Byte

```
  b8,  b7, b6, b5, b4, b3, b2, b1
   |              |
Parity         Amount of Spacing
 Bit           (1/120th to 126/120ths of an inch)
```

BS CODE

The BS code causes reverse motion equal to the last forward motion spacing. Repeated BS codes cause repeated reverse motion.

CAN CODE

The CAN code is a 2-byte command. It is handled the same as the printable character codes described earlier in this section.

CONTROL CODES

All control codes, including ESC sequences, cause the same operation in program mode as they do in normal mode (excluding the BS code and the CAN code).

NOTE

> A code following a printable character code is always recognized as a bit pattern that specifies the amount of spacing and hammer impression level. Therefore, control codes and the NUL code cannot work if they follow a printable character code.

4.6.9.2 Auto Bold Mode

Sequence ESC O sets the auto bold mode. Subsequent printable characters are struck twice with no intervening carriage motion, but the ribbon advances normally between character strikes. A carriage return (excluding auto return) or any one of the sequences ESC &, ESC W, or ESC X reset the auto bold mode.

4.6.9.3 Auto Shadow Mode

Sequence ESC W sets the auto shadow mode. Subsequent printable characters are struck twice with 1/120th of an inch carriage movement and normal ribbon advance between character strikes. A carriage return (excluding auto return) or any one of the sequences ESC &, ESC O, or ESC X reset the auto shadow mode.

4.6.9.4 Auto Underscore Mode

Sequence ESC E initiates the auto underscore mode. The present carriage position is stored in memory as the start position. When the carriage reaches the end position, it returns to the start location and underscores the area between it and the end position. Sequences ESC R or ESC X clear the auto underscore mode.

The end position is defined when one of the following occurs.

- ESC R

  The underscoring occurs and the Spinwriter exits the auto underscore mode.

- CR, LF, VT, RV-LF, 1/2-LF, RV 1/2-LF, REL-VT, AUTO-RET, ESC 3, ESC DC4 C, ESC DC4 D

  The underscoring occurs and the Spinwriter performs each operation defined. The carriage position after performing the operation is stored as the start location.

- ESC X

  No underscoring occurs if ESC X is received between the start location and the end location. The Spinwriter exits the auto underscore mode.

If the area between the start location and the end location has no printable characters and SP code or if the end locations are negative, no underscoring occurs.

For backward printing, the Spinwriter auto underscores.

APPENDIX B
ESCAPE SEQUENCES

This appendix contains tabular information on the following escape sequences.

- Models 7710 and 7720 Escape Key Functions - Table B-1
- Models 7715 and 7725 Escape Key Functions - Table B-2
- Models 7710 and 7720 Absolute Horizontal Tab - Table B-3
- Models 7710 and 7720 Relative Vertical Tab - Table B-4
- Spacing and Forms Advance Control - Table B-5
- Models 7715 and 7725 Motion Index - Table B-6
- Models 7715 and 7725 Tab Index - Table B-7

For an ASCII Coding Chart, see Table B-8. For Decimal Values for ASCII Characters, see Table B-9.

Table B-1 Models 7710 and 7720 Escape Key Functions

KEYS	ESCAPE SEQUENCE
ESC 1	Set Horizontal Tab
ESC 2	Clear Horizontal Tab Stop (Individual)
ESC 3	Print in Red
ESC 4	Print in Black
ESC 5	Set Vertical Tab Stop
ESC 6	Reset Vertical Tab Stop (Individual)
ESC 7	Clear All Horizontal and Vertical Tabs and FF Length
ESC 9	Reverse Line Feed
ESC E	Enter Program Mode
ESC G	Exit Program Mode
ESC J or j	Set Right Margin
ESC K or k	Reset Right Margin
ESC L or l	Set FF Length
ESC M or m	Set Left Margin
ESC O or o	Reset Left Margin
ESC >	Forward Printing

Table B-1 Models 7710 and 7720 Escape Key Functions (cont'd)

KEYS	ESCAPE SEQUENCE
ESC =	Read and Store Switch Settings
ESC <	Reverse Printing
ESC ?	Set Format Mode
ESC @ or`	Reset Format Mode
ESC . (period)	Graphic Mode On (Clear by C_R)
ESC /	Graphic Mode Off
ESC :	Half Line Feed
ESC ;	Half Negative Line Feed
ESC (Δ	Auto Bidirectional Print Enable
ESC) Δ	Auto Bidirectional Print Disable
ESC A ΔΔ	Twin Feeder Hopper 1
ESC B ΔΔ	Twin Feeder Hopper 2
ESC \ E ΔΔ	Twin Feeder Insert/Eject
ESC \ F ΔΔ	Twin Feeder Eject
ESC *	Auto Bold Print On (Clear by C_R)
ESC +	Auto Shadow Print On (Clear by C_R)
ESC ,	Auto Bold//Shadow Off
ESC - (minus)	Auto Underscore On
ESC '	Auto Underscore Off
ESC &	Cancel all WP Modes

ΔG9JHX PCB must be installed.
ΔΔTwin Feeder must be installed.

Examples:

To set the left margin, press the following keys in this order:

1st key ESC
2nd key M (or m)

You can set FORM FEED (FF) length from the keyboard or from a remote location by using the ESC keys as follows:

1. ESC L (or l)
2. ESC ?

These actions load the number of line feeds into the machine for FF length and Format Mode. Additional ESC key functions reset machine as follows:

3. ESC L (sets new FF length)
4. ESC @ or` (resets Format mode)

The new FF count will continue to be used until you change FF by any of the following actions:

1. PWR OFF
2. CLEAR
3. ESC L (or 1)
4. ESC 7

Table B-2 Models 7715 and 7725 Escape Key Functions

CODE	FUNCTION
ESC 1	Set Horizontal Tab Stop
ESC 2	Clear All Tab Stops
ESC 3	Graphics On
ESC 4	Graphics Off
ESC 5	Forward Print On
ESC 6	Backward Print On
ESC 8	Clear Individual Tab Stop
ESC 9	Set Left Margin
ESC 0	Set Right Margin
ESC A	Print in Red
ESC B	Print in Black
ESC D	Negative Half-Line Feed
ESC U	Half-Line Feed
ESC LF	Negative Line Feed
ESC HT (n)	Absolute Horizontal Tab
ESC VT (n)	Absolute Vertical Tab
ESC RS (n)	Define Vertical Motion Index (VMI)
ESC US (n)	Define Horizontal Motion Index (HMI)
ESC SO M	Enter Program Mode
ESC SI	Exit Program Mode
ESC / Δ	Auto Bidirectional Print Enable
ESC \ Δ	Auto Bidirectional Print Disable
ESC DC4 AΔΔ	Twin Feeder Hopper 1
ESC DC4 BΔΔ	Twin Feeder Hopper 2
ESC DC4 CΔΔ	Twin Feeder Insert/Eject
ESC DC4 DΔΔ	Twin Feeder Eject
ESC O	Auto Bold Print On (clear by C_R)
ESC W	Auto Shadow Print On (clear by C_R)
ESC &	Auto Bold/Shadow Print Off
ESC E	Auto Underscore On
ESC R	Auto Underscore Off
ESC X	Cancel All WP Modes

Δ G9JHX PCB must be installed.
ΔΔ Twin Feeder must be installed.

1. To set the left margin, press the following keys in this order:

   First key ESC
   Second key 9

2. To set absolute vertical tab at 52, use the following 3-key ESC sequence.

   First key ESC
   Second key CTRL with K (specifies vertical tab; see Table B-8)
   Third key 5 (see Table B-7)

3. To set absolute horizontal tab at 65, use the following 3-key ESC sequence.

   First key ESC
   Second key CTRL with I (specifies horizontal tab; see Table B-8)
   Third key B (see Table B-7)

4. To change spacing between characters (HMI) and between lines (VMI), press the ESC key, the CTRL key and another key at the same time (see Table B-8) and the wanted setting (see Table B-6).

   To set HMI at 10, press the following keys in this order:

   First key ESC
   Second keys CTRL, SHIFT, and _ (see Table B-8)
   Third keys CTRL K (see Table B-6)

5. To set VMI at 53, press the following keys in this order:

   First key ESC
   Second keys CTRL, SHIFT, and + (see Table B-8)
   Third key 6 (see Table B-6)

6. To set graphics, use the ESC 3 key; to reset, use ESC 4.

   While in the graphics mode, carriage movement is completely separated from printing; that is, printing a character does not automatically move the carriage. The carriage is moved only by executing a tab, space, carriage return, or back space operation.

The tab commands operate the same as they do in normal mode. In graphics mode, however, the space and back space commands move the carriage only 1/60th of an inch instead of the horizontal index selected.

Paper movement commands can be used extensively in graphics. Vertical Tab (VT) and Form Feed (FF) operations are unchanged, but Line Feed (LF) and Negative Line Feed (ESC LF) cause only 1/48th of an inch of paper movement instead of the full line (VMI) movement performed in normal mode.

Table B-3 Models 7710 and 7720 Absolute Horizontal Tab

1st	ESC										
2nd	P		Q		R		S		T		U
3rd	@ 1	P 17	@ 33	P 49	@ 65	P 81	@ 97	P 113	@ 129	P 145	@ 161
	A 2	Q 18	A 34	Q 50	A 66	Q 82	A 98	Q 114	A 130	Q 146	A 162
	B 3	R 19	B 35	R 51	B 67	R 83	B 99	R 115	B 131	R 147	B 163
	C 4	S 20	C 36	S 52	C 68	S 84	C 100	S 116	C 132	S 148	
	D 5	T 21	D 37	T 53	D 69	T 85	D 101	T 117	D 133	T 149	
	E 6	U 22	E 38	U 54	E 70	U 86	E 102	U 118	E 134	U 150	
	F 7	V 23	F 39	V 55	F 71	V 87	F 103	V 119	F 135	V 151	
	G 8	W 24	G 40	W 56	G 72	W 88	G 104	W 120	G 136	W 152	
	H 9	X 25	H 41	X 57	H 73	X 89	H 105	X 121	H 137	X 153	
	I 10	Y 26	I 42	Y 58	I 74	Y 90	I 106	Y 122	I 138	Y 154	
	J 11	Z 27	J 43	Z 59	J 75	Z 91	J 107	Z 123	J 139	Z 155	
	K 12	[28	K 44	[60	K 76	[92	K 108	[124	K 140	[156	
	L 13	\ 29	L 45	\ 61	L 77	\ 93	L 109	\ 125	L 141	\ 157	
	M 14	] 30	M 46	] 62	M 78	] 94	M 110	] 126	M 142	] 158	
	N 15	^ 31	N 47	^ 63	N 79	^ 95	N 111	^ 127	N 143	^ 159	
	O 16	– 32	O 48	– 64	O 80	– 96	O 112	– 128	O 144	– 160	

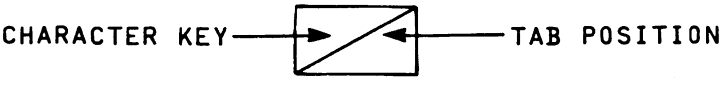


Table B-4 Models 7710 and 7720 Relative Vertical Tab

	Reverse				Forward			
1st	ESC				ESC			
2nd	X		Y		Z		[	
3rd	@ 0	P 16	@ 32	P 48	@ 0	P 16	@ 32	P 48
	A 1	Q 17	A 33	Q 49	A 1	Q 17	A 33	Q 49
	B 2	R 18	B 34	R 50	B 2	R 18	B 34	R 50
	C 3	S 19	C 35	S 51	C 3	S 19	C 35	S 51
	D 4	T 20	D 36	T 52	D 4	T 20	D 36	T 52
	E 5	U 21	E 37	U 53	E 5	U 21	E 37	U 53
	F 6	V 22	F 38	V 54	F 6	V 22	F 38	V 54
	G 7	W 23	G 39	W 55	G 7	W 23	G 39	W 55
	H 8	X 24	H 40	X 56	H 8	X 24	H 40	X 56
	I 9	Y 25	I 41	Y 57	I 9	Y 25	I 41	Y 57
	J 10	Z 26	J 42	Z 58	J 10	Z 26	J 42	Z 58
	K 11	[27	K 43	[59	K 11	[27	K 43	[59
	L 12	\ 28	L 44	\ 60	L 12	\ 28	L 44	\ 60
	M 13	] 29	M 45	] 61	M 13	] 29	M 45	] 61
	N 14	^ 30	N 46	^ 62	N 14	^ 30	N 46	^ 62
	O 15	— 31	O 47	— 63	O 15	— 31	O 47	-- 63

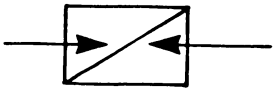


Table B-5 Spacing and Forms Advance Control

		Spacing		Form Advance	
1st	2nd	3rd	(inches)	3rd	(inches)
ESC	]	@	0	P	1/48
		A	1/120	Q	2/48
		B	2/120	R	3/48
		C	3/120	S	4/48
		D	4/120	T	5/48
		E	5/120	U	6/48 (1/8)
		F	6/120	V	7/48
		G	7/120	W	8/48 (1/6)
		H	8/120	X	9/48
		I	9/120	Y	10/48
		J	10/120 (1/12)	Z	11/48
		K	11/120	[	12/48
		L	12/120 (1/10)	\	13/48
		M	13/120	]	14/48
		N	14/120	^	15/48
		O	15/120	–	16/48

Table B-6 Models 7715 and 7725 Motion Index

1st	ESC									
2nd	Vertical Motion Index (VMI) RS					Horizontal Motion Index (HMI) US				
3rd	0 SOH	13 SO	26 ESC	39 (	52 5	65 B	78 O	91 \	104 i	117 v
	1 STX	14 SI	27 FS	40)	53 6	66 C	79 P	92]	105 j	118 w
	2 ETX	15 DLE	28 GS	41 *	54 7	67 D	80 Q	93 ^	106 k	119 x
	3 EOT	16 DC1	29 RS	42 +	55 8	68 E	81 R	94 _	107 l	120 y
	4 ENQ	17 DC2	30 US	43 ,	56 9	69 F	82 S	95 '	108 m	121 z
	5 ACK	18 DC3	31 SP	44 -	57 :	70 G	83 T	96 a	109 n	122 {
	6 BEL	19 DC4	32 !	45 .	58 ;	71 H	84 U	97 b	110 o	123 |
	7 BS	20 NAK	33 "	46 /	59 <	72 I	85 V	98 c	111 p	124 }
	8 HT	21 SYN	34 #	47 0	60 =	73 J	86 W	99 d	112 q	125
	9 LF	22 ETB	35 $	48 1	61 >	74 K	87 X	100 e	113 r	
	10 VT	23 CAN	36 %	49 2	62 ?	75 L	88 Y	101 f	114 s	
	11 FF	24 EM	37 &	50 3	63 @	76 M	89 Z	102 g	115 t	
	12 CR	25 SUB	38	51 4	64 A	77 N	90 [	103 h	116 u	

Table B-7 Models 7715 and 7725 Tab Index

1st	ESC									
2nd	Absolute Horizontal Tab HT					Absolute Vertical Tab VT				
3rd	1 SOH	14 SO	27 ESC	40 (	53 5	66 B	79 O	92 \	105 i	118 v
	2 STX	15 SI	28 FS	41)	54 6	67 C	80 P	93]	106 j	119 w
	3 ETX	16 DLE	29 GS	42 *	55 7	68 D	81 Q	94 ^	107 k	120 x
	4 EOT	17 DC1	30 RS	43 +	56 8	69 E	82 R	95 _	108 l	121 y
	5 ENQ	18 DC2	31 US	44 ,	57 9	70 F	83 S	96 `	109 m	122 z
	6 ACK	19 DC3	32 SP	45 –	58 :	71 G	84 T	97 a	110 n	123 {
	7 BEL	20 DC4	33 !	46 .	59 ;	72 H	85 U	98 b	111 o	124 |
	8 BS	21 NAK	34 "	47 /	60 <	73 I	86 V	99 c	112 p	125 }
	9 HT	22 SYN	35 #	48 0	61 =	74 J	87 W	100 d	113 q	126
	10 LF	23 ETB	36 $	49 1	62 >	75 K	88 X	101 e	114 r	
	11 VT	24 CAN	37 %	50 2	63 ?	76 L	89 Y	102 f	115 s	
	12 FF	25 EM	38 &	51 3	64 @	77 M	90 Z	103 g	116 t	
	13 CR	26 SUB	39	52 4	65 A	78 N	91 [	104 h	117 u	

Table B-8 ASCII Coding Chart

CONTROL MODE	ASCII CODE	UNSHIFTED MODE	ASCII CODE (HEXADECIMAL)	SHIFTED MODE	ASCII CODE
NUL	00	NUL	00	NUL	00
ESC	1B	ESC	1B	ESC	1B
NUL	00	1	31	!	21
NUL	00	2	32	@	40
NUL	00	3	33	#	23
NUL	00	4	34	$	24
NUL	00	5	35	%	25.
NUL	00	6	36	^	5E
NUL	00	7	37	&	26
NUL	00	8	38	*	2A
{	7B	9	39	(	28
}	7D	0	30	)	29
US	1F	-	2D	_	5F
RS	1E	=	3D	+	2B
GS	1D	`	60	~	7E
BS	08	BS	08	BS	08
NUL	00	NUL	00	NUL	00
HT	09	HT	09	HT	09
DC1	11	q	71	Q	51
ETB	17	w	77	W	57
ENQ	05	e	65	E	45
DC2	12	r	72	R	52
DC4	14	t	74	T	54
EM	19	y	79	Y	59
NAK	15	u	75	U	55
HT	09	i	69	I	49
SI	0F	o	6F	O	4F
DLE	10	p	70	P	50
ESC	1B	[	5B	]	5D
FS	1C	\	5C	|	7C
LF	0A	LF	0A	LF	0A
		CTRL			
		LOCK			
SOH	01	a	61	A	41
DC3	13	s	73	S	53
EOT	04	d	64	D	44
ACK	06	f	66	F	46
BEL	07	g	67	G	47
BS	08	h	68	H	48
LF	0A	j	6A	J	4A
VT	0B	k	6B	K	4B
FF	0C	l	6C	L	4C
;	3B	;	3B	:	3A
'	27	'	27	"	22
GS	1D	{	7B	}	7D
CR	0D	CR	0D	CR	0D
		CTRL			
		Function			
		SHIFT			
SUB	1A	z	7A	Z	5A
CAN	18	x	78	X	58
ETX	03	c	63	C	43
SYN	16	v	76	V	56
STX	02	b	62	B	42
SO	0E	n	6E	N	4E
CR	0D	m	6D	M	4D
,	2C	,	2C	<	3C
.	2E	.	2E	>	3E
/	2F	/	2F	?	3F

Table B-9 Decimal Values for ASCII Characters

	Units									
Tens	0	1	2	3	4	5	6	7	8	9
0		SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT
10	LF	VT	FF	CR	SO	SI	DLE	DC1	DC2	DC3
20	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS
30	RS	US	SP'	!	"	#	$	%	&	
40	(	)	*	+	,	—	.	/	0	1
50	2	3	4	5	6	7	8	9	:	;
60	<	=	>	?	@	A	B	C	D	E
70	F	G	H	I	J	K	L	M	N	O
80	P	Q	R	S	T	U	V	W	X	Y
90	Z	[	\	]	^	_	`	a	b	c
100	d	e	f	g	h	i	j	k	l	m
110	n	o	p	q	r	s	t	u	v	w
120	x	y	z	{	|	}	~			

APPENDIX C
CONTROL CODES

The Spinwriter recognizes and processes the control codes of the ASCII control code set listed in Table C-1.

Table C-1 Control Code for ASCII Control Code Set

CODE	MEANING
ETX	End
ACK	Acknowledge
BEL	Bell (Sound Audible Alarm)
BS	Back Space
HT	Horizontal Tab
LF	Line Feed
VT	Vertical Tab
FF	Form Feed
CR	Carriage Return
SO	Shift Out
SI	Shift In
DC1	Device Control 1 (X-ON)
DC3	Device Control 3 (X-OFF)
ESC	Escape

All of the control codes in the ASCII code set are listed in Table C-2. Generate the codes by pressing and holding down the CTRL key and then pressing the second key for the code wanted.

Table C-2 contains a "Key Position" column. This position is a physical locator for each key. For example, key position 34 is the A-key as shown in Figure C-1.

Table C-2 Control Codes

		PRESS KEYS		
CONTROL CODE		SHIFTEDΔ	UNSHIFTEDΔ	KEY POSITION
ESC	CTRL	ESC	ESC	2
NUL	CTRL	!	1	3
NUL	CTRL	@	2	4
NUL	CTRL	#	3	5
NUL	CTRL	$	4	6
NUL	CTRL	%	5	7
NUL	CTRL		6	8
NUL	CTRL	&	7	9
NUL	CTRL	*	8	10
	CTRL	(	9	11
	CTRL	)	0	12
US	CTRL	_ underline	- dash	13
RS	CTRL	+	=	14
GS	CTRL	~	`	15
BS	CTRL	BS	BS	16
HT	CTRL	HT	HT	18
DC1	CTRL	Q	q	19
ETB	CTRL	W	w	20
ENQ	CTRL	E	e	21
DC2	CTRL	R	r	22
DC4	CTRL	T	t	23
EM	CTRL	Y	y	24
NAK	CTRL	U	u	25
HT	CTRL	I	i	26
SI	CTRL	O	o	27
DLE	CTRL	P	p	28
ESC	CTRL	]	[	29
FS	CTRL	¦	\	30
LF	CTRL	LF	LF	31
	CTRL		CTRL	32
	CTRL		LOCK	33
SOH	CTRL	A	a	34
DC3	CTRL	S	s	35
EOT	CTRL	D	d	36
ACK	CTRL	F	f	37
BEL	CTRL	G	g	38
BS	CTRL	H	h	39
LF	CTRL	J	j	40
VT	CTRL	K	k	41
FF	CTRL	L	l	42
;	CTRL	:	;	43
'	CTRL	"	'	44
CR	CTRL	CR	CR	46
	CTRL		SHIFT	49

Table C-2 Control Codes (cont'd)

		PRESS KEYS		
CONTROL CODE		SHIFTED △	UNSHIFTED △	KEY POSITION
SUB	CTRL	Z	z	50
CAN	CTRL	X	x	51
ETX	CTRL	C	c	52
SYN	CTRL	V	v	53
STX	CTRL	B	b	54
SO	CTRL	N	n	55
CR	CTRL	M	m	56
,	CTRL	<	,	57
.	CTRL	>	.	58
/	CTRL	?	/	59
	CTRL		SHIFT	60
DEL	CTRL	DEL	DEL	62
SP	CTRL	SP	SP	63
7	CTRL	7	7	64
8	CTRL	8	8	65
9	CTRL	9	9	66
4	CTRL	4	4	67
5	CTRL	5	5	68
6	CTRL	6	6	69
1	CTRL	1	1	70
2	CTRL	2	2	71
3	CTRL	3	3	72
0	CTRL	0	0	73
.	CTRL	.	.	74
-	CTRL	-	-	75
SP	CTRL	SP	SP	77
,	CTRL	,	,	78
HT	CTRL	HT	HT	79

△ Refers to position of SHIFT key; pressed down (shifted) or up (unshifted).

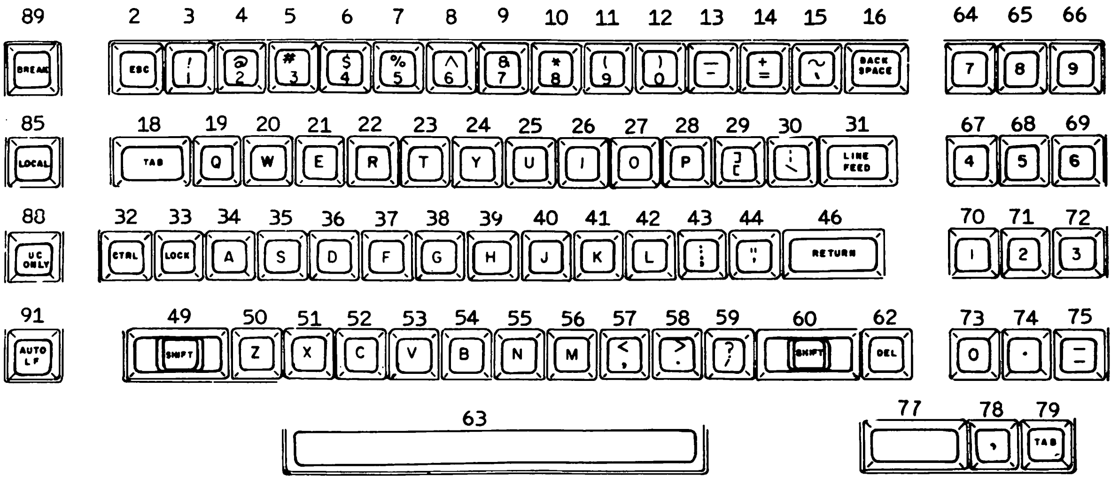


Figure C-1 Key Positions on Keyboard

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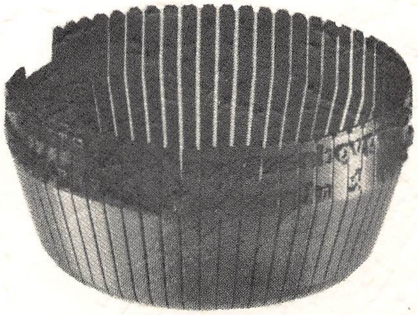

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